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New Sweetpotatoes Make Great Chips, Fries

New sweetpotatoes now being developed by ARS scientists have less sugar and soak up less oil than traditional varieties, making them perfect for great-tasting and nutritious chips and french fries. Both preparations absorb less oil because they have a higher percentage of dry matter. This means they're denser than traditional varieties, so they're crispier and contain less fat. And they have plenty of beta carotene and other nutrients.

For the past eight years, ARS scientists and cooperators at Clemson University have used conventional breeding to develop medium- to light-orange, yellow, or cream-colored sweetpotato breeding lines for new uses. One scientist has been testing them in a small-scale, chip-making kitchen in her ARS laboratory. She is looking for a commercial cooperator to produce and test the fries on a larger scale. If they catch on, consumers could benefit from the extra nutrients

Unlike popular sweet, orange-fleshed U.S. varieties, the new sweetpotatoes resemble those eaten in the tropics and favored by U.S. consumers from Asia, Africa, the Caribbean and South America. The sweetpotatoes grow and produce well in the South and require fewer pesticides because they're resistant to key sweetpotato pests.

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No Trans Fats in Peanut Butter—Contrary to Rumor

Recurring rumors that commercial peanut butters contain trans fats—which appear to increase risk of cardiovascular disease—have no basis in fact, a new study shows. The rumors no doubt started because small amounts of hydrogenated vegetable oils are added to commercial peanut butters—at 1 to 2 percent of total weight—to prevent the peanut oil from separating out. And the hydrogenation process can generate the formation of trans fatty acids in oils.

To see if the rumors had any validity, an ARS researcher prepared 11 brands of peanut butter, including major store brands and "natural" brands, for analysis by a commercial laboratory. He also sent paste freshly prepared from roasted peanuts for comparison. The laboratory found no detectable trans fats in any of the samples, with a detection limit of 0.01 percent of the sample weight, the researcher reported in the *Journal of Agricultural and Food Chemistry*, 2001 (vol. 49, pp. 2349-2351).

That means that a 32-gram serving of any of the 11 brands could contain from zero to a little over three-thousandths (0.0032) of a gram of trans fats without being detected. While current regulations don't require food labels to disclose trans fat levels, they do require disclosure of saturated fat levels at or above five-tenths (0.5) of a gram. For comparison, that's 156 times higher than this study's detection limit for trans fats.

By contrast, peanut butter has plenty of unsaturated fatty acids. The most abundant is oleic acid, the mono-unsaturated fat believed to be good for the cardiovascular system. In this analysis, oleic acid levels ranged from 19 percent of total weight in one private-label brand to 27 percent in one "natural" type. Palmitic acid, the most abundant saturated fatty acid, weighed in at about 5 percent among all brands.

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Good Nutrition Could Help Prevent Bad Viruses

A relatively benign influenza virus has mutated into a nasty pathogen in laboratory mice that were raised on a diet deficient in selenium—a potent antioxidant. And the mutations persisted when the virus was transferred into

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mice fed ample selenium, causing a much more severe case of flu than the original strain.

Seven years ago, a lesser known virus—a strain of coxsackie—mutated from "Jekyll" to "Hyde" in selenium-deficient mice. It happened again in mice deficient in vitamin E—another antioxidant. Now, the same researchers from the University of North Carolina and the Agricultural Research Service, along with new colleagues at the Nestle Research Center in Switzerland, have seen it happen in human influenza virus—a strain isolated in Bangkok in 1979. The findings suggest that many RNA viruses may be susceptible to nutritionally induced oxidative damage, the researchers reported in the *FASEB Journal Express*, 2001 (DOI 01-0115) online at: http://www.fasebj.org.

The phenomenon has global implications. While Americans generally get the recommended dietary levels of selenium, there are pockets of selenium deficiency around the world that might be generating harmful mutations in a number of viruses. Such mutations may also occur in areas where diets are low or devoid of other antioxidants. And viruses know no boundaries.

In the influenza virus, 29 bases in a normally stable section of the viral genome had mutated in the selenium-deficient mice. By contrast, there were no mutations in these same bases from selenium-adequate mice. It shows that the host's nutrition can have considerable influence on the virulence of viral pathogens. And that virulence persists in well-nourished animals and, presumably, people.

The discovery points to the importance of antioxidant protection against viral diseases. Selenium is a critical part of a major antioxidant enzyme that humans and animals produce to protect delicate cellular components against damage from oxygen free radicals. The selenium level in the study's deficient diet was one-sixtieth that of the adequate diet. Good sources of this essential element include Brazil nuts, whole-grain products and meat.

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Less Dietary Fat Offset by More Weight in Kids

Children in the mid-South are eating more "heart healthy" these days. But that won't help unless they learn to balance food consumption and physical activity. According to new findings from the ongoing Bogalusa (Louisiana) Heart Study, kids are losing ground in keeping extra pounds off.

Researchers at ARS' Children's Nutrition Research Center in Houston and at Tulane University in New Orleans have been monitoring the height, weight, eating habits and subsequent heart disease risk of 10-year-old children in Bogalusa since 1973. While the amount of total fat, saturated fat and cholesterol in their diets has decreased, kids today are heavier by nearly 5 pounds—with no change in average height—and more of them are obese, researchers reported in the *American Journal of Epidemiology*, 2001 (vol. 153, pp. 969-77).

Despite the rise in body weight, the number of calories that 10-year-olds consume has held fairly steady over the past 20 years, ranging from about 2,000 to 2,200 calories each day. However, the source of those calories has changed significantly. In the 1990s, children consumed more calories from carbohydrates like fruit, fruit juice, beverages such as sodas, iced tea, coffee and koolaid, and snacks, but fewer from animal fats, candy, eggs and desserts.

Still, over 70 percent of children nationally consume more than the recommended amounts of total and saturated fat. Suggested is no more than 30 percent of calories from fat, including no more than 10 percent of total calories from saturated fat for all Americans over age two.

Physical inactivity could contribute to the higher weight. But researchers also suspect that the dietary assessment tools used in the study might have missed small increases in daily caloric intake that can add up to significant weight gain over time. All it takes is an extra 48 calories a day to gain five pounds a year. Forty-eight calories is about a one-half cup of soda or juice or seven potato chips.

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Ticks Drop Out of Lyme-Light in Control Program

Ticks that transmit Lyme disease have been dropping like flies in parts of Maryland where deer snack on corn in a device developed by ARS scientists in Kerrville, Texas. To reach the corn, deer brush their heads and necks against paint rollers filled with amitraz—a pesticide deadly to ticks but relatively harmless to beneficial insects and wildlife and approved for livestock. This invention—called the "four poster"—offers a tick-control alternative to spraying insecticides into the environment or reducing deer populations.

Each year, more than 10,000 human cases of Lyme disease are reported in the United States—mainly in suburban areas with an overabundance of white-tailed deer. So, in 1997, the U.S. Department of Agriculture

implemented a five-year project to reduce ticks in suburban areas of five Northeast states where the incidence of Lyme disease was highest. The states include Connecticut, Rhode Island, New York and New Jersey, as well as Maryland.

The project aims to reduce blacklegged tick nymphs by 90 percent after five years at each of the 1,280-acre treatment sites. It's the tick's tiny, nymph stage that transmits the Lyme disease bacterium, *Borrelia burgdorferi*, to most people.

In 2000, two years after the feeders were deployed in Maryland, blacklegged tick nymphs had dropped 59 to 71 percent at the three treatment sites. The ARS entomologist anticipates reductions of at least 75 percent after two more years. While tick nymphs are most dangerous to humans, the four-poster feeder targets female adults—before they can lay the eggs that will hatch into larvae that develop into nymphs. Generally, the larvae pick up the Lyme disease pathogen from feeding on infected mice or other small animals.

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Do Navajo Diets Build Better Bones?

Native Americans have denser bones than Caucasians, even though they don't eat many dairy foods. Scientists have cited genetic differences as an explanation for low bone fracture rates among the Navajos, the largest tribe of North American Indians. But environmental and cultural differences also may play a role.

An ARS nutrition researcher is collaborating with investigators at Utah State University to determine how overall mineral intake is related to bone health and other conditions in Navajos living on a reservation that lies in Utah, Arizona and New Mexico. They found that the total intake of minerals important for strong bones is much closer to recommended levels than the diet surveys suggest. And this may partially explain low fracture rates.

The ARS researcher analyzed more than 100 water samples for mineral content and found that the average water intake of two liters a day can provide up to 212 milligrams of calcium, 150 mg of magnesium and 8 mg.of zinc, the researcher reported in *Toxicology*, 2000 (vol. 149, pp. 143-148). Navajos on this reservation get their water from wells, springs and taps and store it in barrels.

The USU researcher analyzed juniper ash and found it rich in calcium, magnesium and zinc—minerals that help build strong bones—the researcher reported in the *Journal of the American Dietetic Association*, 1998 (vol. 98, pp. 187-192, 1998). Navajos burn juniper branches, grind the ash into a powder and add it to breads and traditional corn dishes. The extra minerals in their drinking water and foods may partially explain their low fracture rates.

In older people, fractures of the hip, spine and other bones result from osteoporosis—or "porous bones"—characterized by a decrease in bone density. Nearly 10 million Americans suffer from osteoporosis, according to the National Institutes of Health. It can be prevented or delayed by taking several preventive measures, such as exercising, not smoking, limiting alcohol intake and eating foods that are high in calcium, magnesium and vitamin D.

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Breast-feeding "Remodels" Mom's Bones

New mothers who choose to breast-feed help not only their babies: They could also be building healthier bones for themselves, according to a two-year study. Earlier research that questioned whether breast-feeding is the best option for women at risk for osteoporosis prompted the new study, published in the *Journal of Nutrition*, 2000 (vol. 130, pp. 777-783).

It showed that, while lactation triggers bone loss in areas prone to fractures later in life—such as the hip, wrist, and spine—the lost bone was completely replaced with fresh, new bone within two years of delivery. This bone-loss/recovery cycle, known as remodeling, provides a breast-feeding mother's body a unique opportunity to repair tiny flaws, or microfractures, when the replacement bone is built. Microfractures are thought to contribute to osteoporosis fractures later in life.

Researchers monitored the bone densities of 76 new mothers over a period of two years after delivery. Half breast-fed their infants; the others chose to formula-feed. Bone densities were measured at regular intervals using a sensitive bone scan called DEXA.

In addition to regaining lost bone, mothers who had breast-fed for nine months or less were found to have nearly three percent more bone than right after delivery. Mothers who breast-fed longer—between 10 and 24 months—were also gaining more bone, but at a slower rate. Had the study been longer, this group would probably have shown significant bone gains as well, the researchers believe.

The study also shows that pregnancy itself appears to trigger changes in bone structure. The researchers are investigating these findings in a new study, which monitors pre-pregnancy and postpartum bone densities to better understand how pregnancy affects maternal bone.

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Feeding Preemies for Optimal Intestinal Growth

Growth Premature infants might benefit from receiving more of their nutrition by mouth. That's the implication of a study on the effects of minimal oral feedings on the intestinal growth of newborn piglets, whose gastrointestinal development and function are similar to that of human infants.

While preemies must rely on intravenous feedings to survive, they usually start receiving small amounts of oral tube feedings within days of life to help stimulate intestinal growth and development. The new findings suggests that the usual starting point for these feedings—10 to 15 percent of total nutritional needs—might not be enough to stimulate growth.

The researchers monitored the effect of varying levels of oral versus intravenous feedings on the piglets' intestinal growth. They found that the intestinal tissues did not significantly increase in size, protein content or weight—all measures of growth—until the amount of total nutrients delivered orally reached 40 percent.

Normal development was achieved at a level of 60 percent, they reported in the *American Journal of Clinical Nutrition*, 2000 (vol. 71, pp. 1603- 1610). Because certain nutrients, such as amino acids, play a key role in intestinal growth, the researchers are now evaluating whether the mix and amounts of specific nutrients delivered orally also affects intestinal growth and function. They believe their findings with piglets could lead to clinical studies that test how increasing the amounts of oral tube feedings might benefit the intestinal growth of premature infants.

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Campylobacter Mystery Moves Toward Resolution

ARS scientists believe they have found one major source of the foodborne pathogen, *Campylobacter*: the fertile chicken egg. Their research ultimately may help reduce or prevent this bacterium from entering the marketplace.

Historically, possible sources of the bacteria were thought to be the feed, wild birds, well water, bird fluff and pads in the cages. Through inoculation studies, scientists showed that *Campylobacter* can't survive long in dry conditions, eliminating bird feathers and hatchery transport paper pads from the list of possible sources. Other studies showed that feces on the surface of eggs were an unlikely source of contamination. Thus, attention focused on transmission of the bacteria in the egg itself.

To learn how each new generation of chicks is infected with the bacterium, they traveled to Iceland, where poultry is produced in a closed system. Breeder eggs are obtained from Sweden, hatched in Iceland and quarantined at rearing farms. It is an integrated approach with a high degree of control.

By sequencing genetic material called DNA, a specific gene in *Campylobacter* was isolated and used as a marker to identify identical organisms. Evidence shows that the same *Campylobacter* isolate was detected in poultry production plants about 20 miles apart. The only way the organism was able to travel from one location to the other was in the moist confines of the egg.

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